

Study Course: **Recent Advances in Numerical Modeling and Simulation**
 BI: Wahlfach W35 | CompEng: Optional Course

On different strategies to simulate damage and fracture: **NON-LOCAL DAMAGE, SMEARED/ COHESIVE FRACTURING AND NOVEL METHODS BASED ON LEVEL SETS**

8. May 2015

16:00 – 19:00

IC 03/649

Dr. Fabien Cazes

Ecole Centrale de Nantes, France

The behavior of materials is usually modeled using laws connecting the stress and the strain. These laws are purely local because they are defined independently at each point of the structure. This is not a problem as long as the behavior of the material remains hardening, i.e. with an increasing stress state for an increasing loading of the structure, but numerical mesh dependency problems occur when the behavior becomes softening. Several attempts were made to propose new mesh-independent models, either preserving the continuity of the model, either by introducing a discontinuity into the structure. Up to now, no method is completely satisfactory. Different modeling options will be pre-

sented, especially smeared crack models, Integral non-local damage, gradient/phase-field damage, Thick Level Set models, cohesive elements based fracturing, Strong Discontinuity Approaches (SDA), ie embedded element FEM approaches. Assumptions, advantages and drawbacks of these methods will be presented and some difficulties arising in their numerical implementation will be presented.

